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EXAMINER

FAULK, DEVONA E

ART UNIT PAPER NUMBER

2644

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8

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/367,153

Applicant(s)

SIBBALD ET AL.

Examiner

Devona E. Faulk

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 8/9/99.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 15-53 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 16, 18, 19, 46, 48 and 49 is/are allowed.
- 6) ☒ Claim(s) 15, 17, 20-25, 27, 30-35, 37, 39-45, 47, 50-53 is/are rejected.
- 7) ☒ Claim(s) 18, 19, 26, 28, 29, 36 and 38 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 August 1999 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- 1) ☐ Certified copies of the priority documents have been received.
 - 2) ☒ Certified copies of the priority documents have been received in Application No. 09/367,153.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 15 and 20** are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (page 2, line 23; Figure 8) in view of Massie et al. (U.S. Patent 5,943,427).

Claims 15,17,20-23 share common elements. Regarding claims 15, 17, 20,21, 22 and 23 the applicant's admitted prior art discloses a prior art method of processing an audio signal. It teaches of left and right channel output signals created from a mono sound source, which reads on "providing a right channel and left channel, each of said right channel and left channel carrying said single channel audio signal"; both the left and right channel processed using HRTF on each channel separately which reads on "modifying said single channel audio signal of each of said right channel and said left channel using at least one of a plurality of head response transfer functions to provide a right signal in said right channel for a right ear of said listener and a left signal in said left channel for a left ear of said listener"; both the right and left signals are delayed which reads on "introducing a time delay between said right channel and said left channel to provide cues to perception of a direction of said source position relative to said preferred position of said listener at a given time, and said time delay corresponding to an interaural time difference of said sound from sound source with respect to said listener". The

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interaural time difference describes the time delay between sounds arriving at the left and right ears. It is well known in the art that interaural time difference is a source of localization cues. Massie teaches of a cue calculation process (column 5, lines 18-56; column 6, lines 6-16) comprising a distance processing unit (410) that adjust gains in tandem to provide a distance cue and separately to provide an interaural level difference cue under control of ILD processing unit (412). The ILD processing unit (412) calculates gains applied separately to each channel (column 5, lines 18-23) This occurs separately for each channel (column 5, lines 36-44) This reads on "choosing respective values for magnitude of said left signal and magnitude of said right signal to provide cues for perception of a distance of said source position from said preferred position at said given time". The subsequent discussions of the above named claims will only reference new claimed matter.

Regarding **claim 15**, Massie, as stated above, teaches that both the left and right channel processed using HRTF on each channel separately, which reads on "said respective values for magnitude of said left signal and said magnitude of said right signal are being chosen separately" for the reasons shown above. It is obvious that you would use the respective values of magnitude of the left and right signal to provide cues for perception of the source position from the preferred position at said given time because the goal is to achieve the best possible and most accurate sound. Thus it would have been obvious to one of ordinary skill at the time of the invention to modify the applicant's prior art by incorporating Massie cue calculation process for the benefit of producing or achieving the best sound.

Regarding **claim 20**, the combination of the applicant's admitted prior art and Massie meet all elements of that claim, as stated above in apropos of claim 15, with the exception that at

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least one of said left signal and said right signal is sufficiently small as to be inaudible. This would be a matter of choice as to if one wanted one of the signals to be inaudible. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to make one of signals inaudible for the benefit of having sound produced to one ear.

3. **Claim 17** is rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (page 2, line 23; Figure 8) in view of Massie et al. (U.S. Patent 5,943,427) in further view of Raydon et al. (U.S. Patent 3,969,588).

Regarding **claim 17**, the combination of the applicant's admitted prior art and Massie meet all elements of that claim, as stated above in apropos of claim 15, with the exception of the step of choosing respective values for magnitude of said left signal and magnitude of said right signal comprises providing a look-up table having thereon distances between said source position and respective ears of said listener, said distances corresponding to associative ones of said values for magnitude of said left signal and said magnitude of said right signal and selecting said values for magnitude from said look-up table. Raydon discloses a look-up table having gain settings as a function of distance (column 19, lines 59-64). This reads on the claimed matter. Using a computer program to implement the processing is obvious for the benefit of having the most precise and accurate data and to have stable operations. It would have been obvious to modify the apparatus of the combination of the applicant's admitted prior art and Massie by having a look-up table to retrieve values for the benefit of reducing processing time.

4. **Claim 21** is rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (page 2, line 23; Figure 8) in view of Massie et al. (U.S. Patent 5,943,427) in further view of Abel et al. (U.S. Patent 6,009,178).

Regarding claim 21, the combination of the applicant's admitted prior art and Massie meet all elements of that claim, as stated above in apropos of claim 15, with the exception of the left signal and the right signal are compensated to provide at least one of a cancellation and a reduction of transaural crosstalk when said left signal and said right signal are supplied through said left channel and said right channel respectively for replay by loudspeakers. Abel teaches of a system and method for providing a two-channel signal to the ears of a listener through an audio system comprising a crosstalk removal circuit (303; Figures 3A and 3B). Transaural means to deliver binaural signals to the ears of a listener using stereo loudspeakers. Therefore, Abel's system reads on the claimed matter. Crosstalk cancellation is well known in the art and is essential and critical to all head-related transfer function (HRTF) based 3D sound systems. Thus it would have been obvious to one of ordinary skill in the art at the time of filing to use transaural crosstalk for the benefit of delivering clean left and right channel binaural signals to the ears of the listener.

5. **Claims 22 and 23** are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (page 2, line 23; Figure 8) in view of Massie et al. (U.S. Patent 5,943,427) in further view of Sibbald et al. (U.S. Patent 5,666,425).


Regarding **claim 22**, the combination of the applicant's admitted prior art and Massie meet all elements of that claim, as stated above in apropos of claim 15, with the exception of combining said left signal and said right signal with other two or more channel audio signals.

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Sibbald discloses plural sound processing where a left and right channel (36 and 38) are added to equalized left and right signal (44 and 46) using adders 48 and 50. This reads on “combining said left and said right signal with other two or more channel audio signals”. Combining signals is well known in the art. It would have been obvious to combine the signals as claimed for the benefit of producing a left and right combined signal.

Claim 23 claims the method of claim 22 wherein said step of combining adding respective contents of said left channel and said right channel to corresponding channels of said other two or more channel signals. The combination of the applicant’s admitted prior art, Massie and Sibbald meet all elements of claim 22. Combining the signals as claimed in 22 inherently includes adding respective contents of said left and said right channel as claimed. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the left and right signals with two or more other channel audio signals for the benefit of producing a left and right combined signal.

6. **Claims 45, 50** are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant’s admitted prior art (page 2, line 23; Figure 8) in view of Massie et al. (U.S. Patent 5,943,427).



Claims 14, 47, 50-53 share common elements. Regarding **claim 45, 47, 50-53**, the applicant’s admitted prior art discloses a prior art method of processing an audio signal. It teaches of a mono sound source which reads on “an audio signal”; left and right channel output signals created from that mono sound source and both the left and right channel processed using HRTF on each channel separately which reads on “a right signal for a right ear of a listener, said right signal being obtained by modifying a single channel audio signal using at least one of a plurality of head response transfer functions, said single channel audio signal corresponding to a

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sound from a sound source located at a source position relative to a preferred position of said listener” and also reads on “a left signal for a left ear of said listener, said left signal being obtained by modifying said single channel audio signal using at least one of a plurality of head response transfer functions”; both the right and left signals are delayed which reads on “wherein said left signal and said right signal having there between a time delay to provide cues to perception of a direction of said source position relative to preferred position of said listener at a given time, said time delay corresponding to an interaural time difference of said sound from said sound source with respect to said listener”. The interaural time difference describes the time delay between sounds arriving at the left and right ears. It is well known in the art that interaural time difference is a source of localization cues. Massie teaches of a cue calculation process (column 5, lines 18-56; column 6, lines 6-16) comprising a distance processing unit (410) that adjust gains in tandem to provide a distance cue and separately to provide an interaural level difference cue under control of ILD processing unit (412). The ILD processing unit (412) calculates gains applied separately to each channel (column 5, lines 18-23) This occurs separately for each channel (column 5, lines 36-44) This reads on “wherein respective values for magnitude of said left signal and magnitude of said right signal to provide cues for perception of a distance of said source position from said preferred position at said given time”. The above elements are shared between claims 47,50-53. Thus, subsequent discussions of the above named claims will only reference new claimed matter.

Regarding **claim 45**, Massie also reads on “said respective values for magnitude of said left signal and said magnitude of said right signal are being chosen separately”. It is obvious that you would use the respective values of magnitude of the left and right signal to provide cues

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for perception of the source position from the preferred position at said given time because the goal is to achieve the best possible and most accurate sound. Thus it would have been obvious to one of ordinary skill at the time of the invention to modify the applicant's prior art by incorporating Massie cue calculation process for the benefit of producing or achieving the best sound.

Regarding **claim 50**, the combination of the applicant's admitted prior art and Massie meet all elements of that claim, as stated above in apropos of claim 15, with the exception that at least one of said left signal and said right signal is sufficiently small as to be inaudible. This would be a matter of choice as to if one wanted one of the signals to be inaudible. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to make one of signals inaudible for the benefit of having sound produced to one ear.

7. **Claim 47** is rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (page 2, line 23; Figure 8) in view of Massie et al. (U.S. Patent 5,943,427) in further view of Raydon et al. (U.S. Patent 3,969,588).

Regarding **claim 47**, the combination of the applicant's admitted prior art and Massie meet all elements of that claim, as stated above in apropos of claim 45, with the exception said respective values for magnitude of said left signal and magnitude of said right signal are chosen by selecting said values for magnitude from a look-up table having thereon distances between said source position and respective ears of said listener, said distances corresponding to associative ones of said values for magnitude of said left signal and said magnitude of said right signal and selecting said values for magnitude from said look-up table. Raydon discloses a look-

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up table having gain settings as a function of distance (column 19, lines 59-64). This reads on the claimed matter. It would have been obvious to modify the apparatus of the combination of the applicant's admitted prior art and Massie by having a look-up table to retrieve values for the benefit of reducing processing time.

8. **Claim 51** is rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (page 2, line 23; Figure 8) in view of Massie et al. (U.S. Patent 5,943,427) in further view of Abel et al. (U.S. Patent 6,009,178).

Regarding **claim 51**, the combination of the applicant's admitted prior art and Massie meet all elements of that claim, as stated above in apropos of claim 45, with the exception that said left signal and the right signal are compensated to provide at least one of a cancellation and a reduction of transaural crosstalk when said left signal and said right signal are supplied through said left channel and said right channel respectively for replay by loudspeakers. Abel teaches of a system and method for providing a two-channel signal to the ears of a listener through an audio system comprising a crosstalk removal circuit (303; Figures 3A and 3B). Transaural means to deliver binaural signals to the ears of a listener using stereo loudspeakers. Therefore, Abel's system reads on the claimed matter. Crosstalk cancellation is well known in the art and is

9. **Claims 52 and 53** are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (page 2, line 23; Figure 8) in view of Massie et al. (U.S. Patent 5,943,427) in further view of Sibbald et al. (U.S. Patent 5,666,425).

Regarding **claim 52**, the combination of the applicant's admitted prior art and Massie meet all elements of that claim, as stated above in apropos of claim 45, with the exception of

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combining said left signal and said right signal with other two or more channel audio signals.

Sibbald discloses plural sound processing where a left and right channel (36 and 38) are added to equalized left and right signal (44 and 46) using adders 48 and 50. This reads on “combining said left and said right signal with other two or more channel audio signals”. Combining signals is well known in the art. It would have been obvious to combine the signals as claimed for the benefit of producing a left and right combined signal.

Claim 53 claims the audio signal of claim 52, wherein said step of combining adding respective contents of said left channel and said right channel to corresponding channels of said other two or more channel signals. The combination of the applicant’s admitted prior art , Massie and Sibbald meet all elements of claim 52. Combining the signals as claimed in 52 inherently includes adding respective contents of said left and said right channel as claimed. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the left and right signals with two or more other channel audio signals for the benefit of producing a left and right combined signal.

10. The indicated allowability of **claim 24-33** are withdrawn in view of the newly discovered reference(s) to Massie et al. (U. S. Patent 5,943,427) , Raydon et al. (U.S. Patent 3,969,588), Abel et al. (U.S. Patent 6,009,178) and Sibbald et al. (U.S. Patent 5,666,425) . Rejections based on the newly cited reference(s) follow.

Regarding claims 24 and 25 the applicant’s admitted prior art discloses a prior art method of processing an audio signal. It teaches of left and right channel output signals created

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from a mono sound source, which reads on “providing a right channel and left channel, each of said right channel and left channel carrying said single channel audio signal”; both the left and right channel processed using HRTF on each channel separately which reads on “modifying said single channel audio signal of each of said right channel and said left channel using at least one of a plurality of head response transfer functions to provide a right signal in said right channel for a right ear of said listener and a left signal in said left channel for a left ear of said listener”; both the right and left signals are delayed which reads on “introducing a time delay between said right channel and said left channel to provide cues to perception of a direction of said source position relative to said preferred position of said listener at a given time, and said time delay corresponding to an interaural time difference of said sound from sound source with respect to said listener”. The interaural time difference describes the time delay between sounds arriving at the left and right ears. It is well known in the art that interaural time difference is a source of localization cues. Massie teaches of a cue calculation process (column 5, lines 18-56; column 6, lines 6-16) comprising a distance processing unit (410) that adjust gains in tandem to provide a distance cue and separately to provide an interaural level difference cue under control of ILD processing unit (412). The ILD processing unit (412) calculates gains applied separately to each channel (column 5, lines 18-23) This occurs separately for each channel (column 5, lines 36-44) This reads on “choosing respective values for magnitude of said left signal and magnitude of said right signal to provide cues for perception of a distance of said source position from said preferred position at said given time”. Using a computer program to implement the processing is obvious for the benefit of having the most precise and accurate data and to have stable operations. Thus it would have been obvious to one of ordinary skill at the time of the invention

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to modify the applicant's prior art by incorporating Massie cue calculation process for the benefit of producing or achieving the best sound.

Regarding **claim 30**, the combination of the applicant's admitted prior art and Massie meet all elements of that claim, as stated above in apropos of claim 24, with the exception that at least one of said left signal and said right signal is sufficiently small as to be inaudible. This would be a matter of choice as to if one wanted one of the signals to be inaudible. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to make one of signals inaudible for the benefit of having sound produced to one ear.

11. **Claim 27** is rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (page 2, line 23; Figure 8) in view of Massie et al. (U.S. Patent 5,943,427) in further view of Raydon et al. (U.S. Patent 3,969,588).

Claim 27 claims the computer readable storage medium of claim 24 wherein said set of instructions for choosing respective values of magnitude of said left signal and magnitude of said right signal comprises a set of instructions for providing a look-up table having thereon distances between said source position and respective ears of said listener, said distances corresponding to associative ones of said values for magnitude of said left signal and said magnitude of said right signal and selecting said values for magnitude from said look-up table. As stated above apropos of claim 24, the combination of the applicant's admitted prior art and Massie meet all elements of that claim, as stated above in apropos of claim 24. Raydon discloses a look-up table having gain settings as a function of distance (column 19, lines 59-64). This reads on the claimed matter. Using a computer program to implement the processing is obvious for the benefit of

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having the most precise and accurate data and to have stable operations. It would have been obvious to modify the apparatus of the combination of the applicant's admitted prior art and Massie by having a look-up table to retrieve values for the benefit of reducing processing time.

12. **Claim 31** is rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (page 2, line 23; Figure 8) in view of Massie et al. (U.S. Patent 5,943,427) in further view of Abel et al. (U.S. Patent 6,009,178).

Regarding claim 31, the combination of the applicant's admitted prior art and Massie meet all elements of that claim, as stated above in apropos of claim 24, with the exception that the left signal and the right signal are compensated to provide at least one of a cancellation and a reduction of transaural crosstalk when said left signal and said right signal are supplied through said left channel and said right channel respectively for replay by loudspeakers. Abel teaches of a system and method for providing a two-channel signal to the ears of a listener through an audio system comprising a crosstalk removal circuit (303; Figures 3A and 3B). Transaural means to deliver binaural signals to the ears of a listener using stereo loudspeakers. Therefore, Abel's system reads on the claimed matter. Crosstalk cancellation is well known in the art and is essential and critical to all head-related transfer function (HRTF) based 3D sound systems. Using a computer program to implement the processing is obvious for the benefit of having the most precise and accurate data and to have stable operations. Thus it would have been obvious to one of ordinary skill in the art at the time of filing to use transaural crosstalk for the benefit of delivering clean left and right channel binaural signals to the ears of the listener.

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13. **Claims 32 and 33** are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (page 2, line 23; Figure 8) in view of Massie et al. (U.S. Patent 5,943,427) in further view of Sibbald et al. (U.S. Patent 5,666,425).

Regarding **claim 32**, the combination of the applicant's admitted prior art and Massie meet all elements of that claim, as stated above in apropos of claim 24, with the exception of computer readable medium including an instruction for combining said left signal and said right signal with other two or more channel audio signals. Sibbald discloses plural sound processing where a left and right channel (36 and 38) are added to equalized left and right signal (44 and 46) using adders 48 and 50. This reads on "combining said left and said right signal with other two or more channel audio signals". Combining signals is well known in the art. It would have been obvious to combine the signals as claimed for the benefit of producing a left and right combined signal.

Claim 33 claims the computer readable storage medium of claim 32 , wherein said set of instructions for combining said left and right channel with two or more channel audio signals comprises a set of instructions for combining adding respective contents of said left channel and said right channel to corresponding channels of said other two or more channel signals. The combination of the applicant's admitted prior art , Massie and Sibbald meet all elements of claim 22. Combining the signals as claimed in 32 inherently includes adding respective contents of said left and said right channel as claimed. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the left and right signals with two or more other channel audio signals for the benefit of producing a left and right combined signal.

14. The indicated allowability of **claim 34-43** are withdrawn in view of the newly discovered reference(s) to Massie et al. (U. S. Patent 5,943,427), Raydon et al. (U.S. Patent 3,969,588), Abel et al. (U.S. Patent 6,009,178) and Sibbald et al. (U.S. Patent 5,666,425) .. Rejections based on the newly cited reference(s) follow.

Regarding claim **34**, the applicant's admitted prior art discloses a prior art method of processing an audio signal. It teaches of left and right channel output signals created from a mono sound source, which reads on "providing a right channel and left channel, each of said right channel and left channel carrying said single channel audio signal"; both the left and right channel processed using HRTF on each channel separately which reads on "modifying said single channel audio signal of each of said right channel and said left channel using a t least one of a plurality of head response transfer functions to provide a right signal in said right channel for a right ear of said listener and a left signal in said left channel for a left ear of said listener" and on "said respective values for magnitude of said left signal and said magnitude of said right signal are being chosen separately" for the reasons shown above; both the right and left signals are delayed which reads on "introducing a time delay between said right channel and said left channel to provide cues to perception of a direction of said source position relative to said preferred position of said listener at a given time, and said time delay corresponding to an interaural time difference of said sound from sound source with respect to said listener". The interaural time difference describes the time delay between sounds arriving at the left and right

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ears. The means are obviously present and necessary for the process to be carried out. It is well known in the art that interaural time difference is a source of localization cues. Massie teaches of a cue calculation process (column 5, lines 18-56; column 6, lines 6-16) comprising a distance processing unit (410) that adjust gains in tandem to provide a distance cue and separately to provide an interaural level difference cue under control of ILD processing unit (412). The ILD processing unit (412) calculates gains applied separately to each channel (column 5, lines 18-23). This occurs separately for each channel (column 5, lines 36-44). This reads on "said means for choosing respective values for magnitude of said left signal and magnitude of said right signal to provide cues for perception of a distance of said source position from said preferred position at said given time". It is obvious that you would use the respective values of magnitude of the left and right signal to provide cues for perception of the source position from the preferred position at said given time because the goal is to achieve the best possible and most accurate sound. Thus it would have been obvious to one of ordinary skill at the time of the invention to modify the applicant's prior art by incorporating Massie cue calculation process for the benefit of producing or achieving the best sound. Thus it would have been obvious to one of ordinary skill at the time of the invention to modify the applicant's prior art by incorporating Massie cue calculation process for the benefit of producing or achieving the best sound.

Claim 35 claims the apparatus of claim 34, wherein said means for choosing said respective values is adapted to choose said respective values for magnitude of said left signal and said magnitude of said right signal separately. As stated above apropos of claim 34, the combination of the applicant's admitted prior art and Massie meet all elements of that claim. Massie teaches that the ILD processing unit (412) calculates gains applied separately to each

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channel (column 5, lines 18-23) . This occurs separately for each channel (column 5, lines 36-44). This reads on choosing respective values for magnitude of the left and right signals as claimed. It would have been obvious to one of ordinary skill in the art to modify the applicant's prior art by incorporating Massie cue calculation process for the benefit of producing or achieving the best sound to each ear of the listener.

Regarding **claim 40**, the combination of the applicant's admitted prior art and Massie meet all elements of that claim, as stated above in apropos of claim 15, with the exception that at least one of said left signal and said right signal is sufficiently small as to be inaudible. This would be a matter of choice as to if one wanted one of the signals to be inaudible. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to make one of signals inaudible for the benefit of having sound produced to one ear.

15. **Claim 37** is rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (page 2, line 23; Figure 8) in view of Massie et al. (U.S. Patent 5,943,427) in further view of Raydon et al. (U.S. Patent 3,969,588).

Claim 37 claims the apparatus of claim 34, wherein the means for choosing respective values for magnitude of said left signal and magnitude of said right signal comprises a look-up table having thereon distances between said source position and respective ears of said listener, said distances corresponding to associative ones of said values for magnitude of said left signal and said magnitude of said right signal and means for selecting said values for magnitude. . Raydon discloses a look-up table having gain settings as a function of distance (column 19, lines 59-64). If there is a look-up table there is obviously a means for selecting the values of that

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table. This reads on the claimed matter. It would have been obvious to modify the apparatus of the combination of the applicant's admitted prior art and Massie by having a look-up table to retrieve values for the benefit of reducing processing time.

16. **Claim 41** is rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (page 2, line 23; Figure 8) in view of Massie et al. (U.S. Patent 5,943,427) in further view of Abel et al. (U.S. Patent 6,009,178).

Claim 41 claims the apparatus of claim 34 further comprising a compensating means for providing at least one of a cancellation and a reduction of transaural crosstalk in said left signal and said right signal when said left signal and said right signal are supplied through said left channel and said right channel respectively for replay by loudspeakers. Abel teaches of a system and method for providing a two-channel signal to the ears of a listener through an audio system comprising a crosstalk removal circuit (303; Figures 3A and 3B). Transaural means to deliver binaural signals to the ears of a listener using stereo loudspeakers. Therefore, Abel's system reads on the claimed matter. Crosstalk cancellation is well known in the art and is essential and critical to all head-related transfer function (HRTF) based 3D sound systems. Thus it would have been obvious to one of ordinary skill in the art at the time of filing to use transaural crosstalk for the benefit of delivering clean left and right channel binaural signals to the ears of the listener.

Allowable Subject Matter

17. Claims **26,28,29,36, and 38** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

18. Claims **16 and 46** are allowable.

19. The following is an examiner's statement of reasons for allowance:

Regarding claims, 16 and 46, the applicant's admitted prior art and Massie et al. (U. S. Patent 5,943,427) combine to meet all elements of both claims with the exception of determining the magnitude of the left and right signal based on the inverse square of distance between the source position and respective ears of said listener. Prior art Myers (U.S. Patent 4,817,149 does teach of the inverse square of distance relationship to sound. Other prior art also teach of the relationship however, the prior art, or combination thereof, fails to disclose or make obvious determining the magnitude of a left and right signal based on the inverse square of distance as claimed.

6. Claims **18 and 19** are allowable due to dependency on claim 16.

7. Claim **48 and 49** are allowable due to dependency on claim 46.

8. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."


XU MEI
PRIMARY EXAMINER